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COVID-19 pandemic in Finland – Preliminary analysis on health system response and economic consequences

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ABSTRACT

Objectives: The objective of this study was to describe and analyze the impact of the coronavirus disease COVID-19 on health policy, social- and health system, and economic and financing system to prevent, treat, contain and monitor the virus in Finland.

Methods: This study provides early outcomes of health policy measures, social- and health system capacity as well as economic challenges in COVID-19 pandemic in Finland. This paper is based available documents and reports of different ministries and social, health and economic authorities collected online. This was complemented by other relevant pandemic data from Finland.

Results: The impact of COVID-19 pandemic on the Finnish society has been unpredictable although it has not been as extensive and massive than in many other countries. As the situation evolved the Government took strict measures to stop the spread of the virus (e.g. Emergency Powers Act). Available information shows that the economic consequences will be drastic also in Finland, albeit perhaps less dramatic than in large industrial economies.

Conclusions: Finland has transferred gradually to a “hybrid strategy”, referring to a move from extensive restrictive measures to enhanced management of the epidemic. However, health system must be prepared for prospective setback. It is possible, that COVID-19 pandemic has accelerated the development of digital health services and telemedicine in Finnish healthcare system.

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1. Introduction

The first coronavirus case in Finland was diagnosed for a Chinese tourist in a holiday resort in Lapland on January 29th, 2020. On February 13rd, 2020 COVID-19 infection was included in the list of generally hazardous communicable diseases by amending the Government Decree on Communicable Diseases. However, the situation with the spread of COVID-19 in Finland started to evolve only in early March, boosted by travel to the Alps during the winter holidays in February.

COVID-19 epidemic was considered to have started in Finland in mid-March soon after the WHO had announced the COVID-19 outbreak as a pandemic. On March 16th 2020 the Finnish Govern-

ment announced a state of emergency due to the coronavirus outbreak and consequently implemented several physical distancing measures aimed at slowing the spread and protecting risk groups.

So far, Finland has been successful in restraining the pandemic. Compared to many countries, the pandemic landed in Finland late. That allowed early implementation of restrictive regulations and recommendations. However, these measures which have been obeyed well by the population have probably had several negative, unintended consequences.

This paper provides an overview of Finland's healthcare system, COVID-19 trends, policy interventions, health response data and the economic and financial impact of the pandemic. Data were collected from various sources, including governments and ministerial reports, newspaper articles and international databases, such as the COVID-19 Health System Response Monitor by the European Observatory on Health Systems and Policies and OECD coun-

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try and coronavirus web service to understand the development of the pandemic and the policy interventions to address the pandemic [1,2].

2. Country description

2.1. Finnish health system overview

In Finland (population 5.5 million) the health system is decentralized, and its funding comes from multiple channels. The core health system is organized by municipalities (i.e. local authorities, $n=311$) which are responsible for financing primary and specialized care. The municipalities have the right to levy taxes. In addition they get funding state transfers and user's fees. The municipalities can organize health care for their residents themselves or the service can be organized in collaboration with another municipality or a joint municipal authority. The organizing function includes being responsible for defining and monitoring service volume and quality, assessing the needs of the population, ensuring equal distribution of services, deciding on the method of provision (e.g. own provision vs. outsourcing), and acting as public authority in decision-making. Primary care is delivered through primary health centers and their units, often with multiprofessional staffing. In the statutory health system, specialized medical care is provided by hospital districts. These districts are managed and funded by the municipalities within their catchment area and are responsible for organizing and providing specialist medical services for the residents of member municipalities. The mainland Finland is divided into 20 hospital districts, which run 15 regional hospitals and five university hospitals [3,4].

The national hospital system delivers high quality care for acute conditions, but recognized challenges have been to improve primary care for a growing number of people with chronic conditions, to promote greater coordination between primary care and hospitals. Elderly care is the responsibility of municipalities and home care and service housing are the main types of services, the latter often provided by private providers [2].

The COVID-19 epidemic has not changed the general distribution of responsibilities between different actors in the health and social system. This means that any measures implemented in the public health system due to the epidemic are in the first instance funded by municipalities. However, while the municipal sector overall has run in deficit and in recent years a growing number of municipalities have had difficulties with managing their responsibilities, the government has released financial aid to support municipalities with the COVID-19 pandemic [1].

Some larger municipalities such as the cities of Helsinki and Tampere have assigned special clinics to patients with respiratory symptoms to make the use of services safer [1]. The five university hospital districts are legally obliged to plan and coordinate care in their catchment areas, while all hospital districts and municipalities are responsible for epidemic preparedness and management in their respective geographical areas.

Finland does not have a specific agency mandated for active engagement, policy implementation and oversight of the epidemic, which caused confusion especially in the beginning. The distribution of work between municipalities and hospital districts has remained normal. However, the Government declares the state of the emergency and activating the Emergency Powers Act strengthened national level steering in the normally highly decentralized country [1].

2.2. Risk factors of health

For the Finnish population, life expectancy has increased by nearly four years since 2000, but many of the additional years

are spent with some chronic diseases and disabilities, raising demands on health and long-term care systems. Trends show that the share of people aged 65 and over is steadily growing because of rising life expectancy and declining fertility rates [2].

The life expectancy of Finns at age 65 now exceeds 20 years. In 2017, 21% of the population was aged 65 years old and over which is notable as COVID-19 infection is more risky for the elderly people [5,6]. Three in five of those aged 65 or over reported having at least one chronic condition or disability, which is a higher proportion than in the EU on average. While most people can continue to live independently in old age, one in eight reports some limitations in activities of daily living [3]. There are regional variations in demographics and morbidity across different regions in Finland [7].

The socioeconomic disparities in health and life expectancy remain large, mainly due to preventable risk factors. A socioeconomic gradient can be seen in smoking, where progress has been made, but alcohol use in general remain problems [2]. Approximately 20% of the population is obese, which is a growing public health issue due to physical inactivity and poor nutrition habits [2]. The incidence of diabetes is high and there are approximately 400,000 diabetics in Finland: 50,000 (T1D) and 350,000 (T2D). In addition, an approximately 100,000 Finns suffer from T2D without knowing it [8]. The Finnish population features, risk factors and health system overview are summarized in Table 1.

3. COVID-19 trends

3.1. Overview of data availability and data transparency

While the Finnish Institute for Health and Welfare (THL) is the main national statistical and registry authority for the health and social sector, it is also responsible for collecting the COVID-19 data. In the beginning the data on COVID-19 laboratory tests were collected directly from the laboratories and hospitals conducting the tests, but as the pandemic evolved the number of tests and test results are reported through the National Infectious Disease Register maintained by THL. Due to a few days delay in recording the data in the Register, the most recent daily figures are not complete.

The numbers of COVID-19 patients treated in hospitals and intensive care units have been collected through the hospital districts. The districts also report data on COVID-19 related infections and deaths in their region. THL and hospital districts report data on a different basis – THL reports data based on the patient's residence, while hospital districts report the test results that have been done in their area. The reporting system has functioned well, but in early days there was a misconception of the reporting responsibilities in some areas, which resulted in a later corrected failure in reporting deaths in elderly care institutions. The reporting has focused on cases confirmed by laboratory tests. The data on intensive care (IC) is collected by the Intensive Care Coordination Office of the Kuopio University Hospital for the Finnish Intensive Care Consortium [1].

The COVID-19 data are released at the THL website. The collected data have been published daily from the start of the pandemic. THL has been criticized for not giving out detailed information on the deaths and patients treated in the hospitals [1]. For instance, the breakdown of the cases according to age and sex was not initially reported. Detailed data on intensive care were only released weekly by the IC Coordinating Office. THL has also been criticized for not releasing the methodological details and assumptions used for modelling the epidemic [1]. There are also no published data on contact tracing.

Table 1
Country and health system overview of Finland.

Population features	Finland	OECD
Total population	5 522 858	1 301 969 697
Population density	18,1 / km²	
Old age dependency ratio	39,5	31,5
Share of the population >65 years old	16,1	17,204
Life expectancy	81	80,7
Life expectancy at later stage in life cycle (over 65 year old)	20.2	
Risk factors of health		
Alcohol consumption, blinge drinking	34	
Adult population smoking daily	14,0	18,0
Chronic condition prevalence	Three in five Finns aged 65 and over reported having at least one chronic condition.	
Diabetes I and II prevalence	9,0	6,4
Overweight or obese population	67,6	
Health care expenditure		
Health system design	Finland has a universal tax-funded health system with majority of services provided by public providers. In addition there are services that are partly reimbursed through compulsory Social Insurance and occupational health care system organised by employers.	
Health care expenditure as % of GDP	9,2	8,8
Health care expenditure per capita EUR	3036	3994
Financing	75% of health spending is publicly funded. 20% of health spending is paid out-of-pocket by households (mainly on pharmaceuticals, dental care and outpatient care).	
Coverage	All permanent residents	
Delivery of care	A wide range of health services and goods are publicly covered, but user fees apply to most of these – notably to pharmaceuticals and dental care.	
Relevant health system changes due to COVID-19 in financing and provision	No significant changes. Main responsibility centralized in public healthcare.	
Health workforce		
Practicing doctors per 1000 pop	3.2	3,5
Practicing nurses per 1000 pop	14.3	8,8
N of doctors	20 970	
N of nurses	102 000	
Health care resources		
Hospital beds (N)	11 000	
Hospital beds per population	3,3	4,7
Hospital beds ICU (N)	400	
Ventilators	Some thousand ventilators in the country	

3.2. COVID-19 cases, deaths, hospitalizations and recoveries

The first COVID-19 death in Finland was reported on 21st March. At the time 17 patients were in hospitalized and five of them treated at ICUs. At the national level the number of hospitalized patients peaked on the 8th and 9th of April when there were altogether 244 patients were hospitalized of which 82 were treated at ICUs [9].

On August 10, 2020 five patients were in hospital and one of them at ICU care. By August 10, 2020 the number of COVID-19 cases reported was 7,464 and the number of deaths 333 and some 6,980 (over 90% of all reported cases) had recovered. The numbers of COVID-19 cases in Finland are described in the following figures in detail (Figs. 1–2). After the low rates in June– July 2020 the number of diagnosed COVID-19 cases have started to increase slightly in August according to the most recent reports.

The capital region has been the epidemic centre in Finland. However, at the end of April 2020 the highest incidence of the COVID-19 infections was in the Länsi-Pohja hospital district located in the North-West of Finland. The Länsi-Pohja district also recorded the highest increase in COVID-19 incidence at that time while at the same time in most other hospital districts incidence rates were declining [9]. The area is bordering Sweden but according to the

hospital district the high number of cases was due to a local outbreak. It is important to note while analyzing spread near border areas that e.g. opening the schools in Finland (in Sweden schools were not closed) did not appear to impact the spread [10].

Parallel to the high number of the cases in the Helsinki region, over 80% of deaths and 70% of ICU treated patients have been located in the Helsinki University Hospital catchment area. To date, 41% of deaths have occurred in elderly care institutions and 38% in healthcare center wards usually treating elderly patients with multimorbidity, whereas 19% in hospitals. The numbers of COVID-19 incidence and daily number of laboratory-confirmed COVID-19 infection patients in intensive care units in Finland are described in Figs. 3. and 4.

4. Policy and technology roadmap

4.1. Policies aimed at curbing spread, transmission and improving cure

The grounds for the preparedness and policy measures taken forward in Finland have been laid down in different policies (e.g. the National preparedness plan for an influenza pandemic), ordinary laws (Communicable Diseases Act) and legislation on emer-

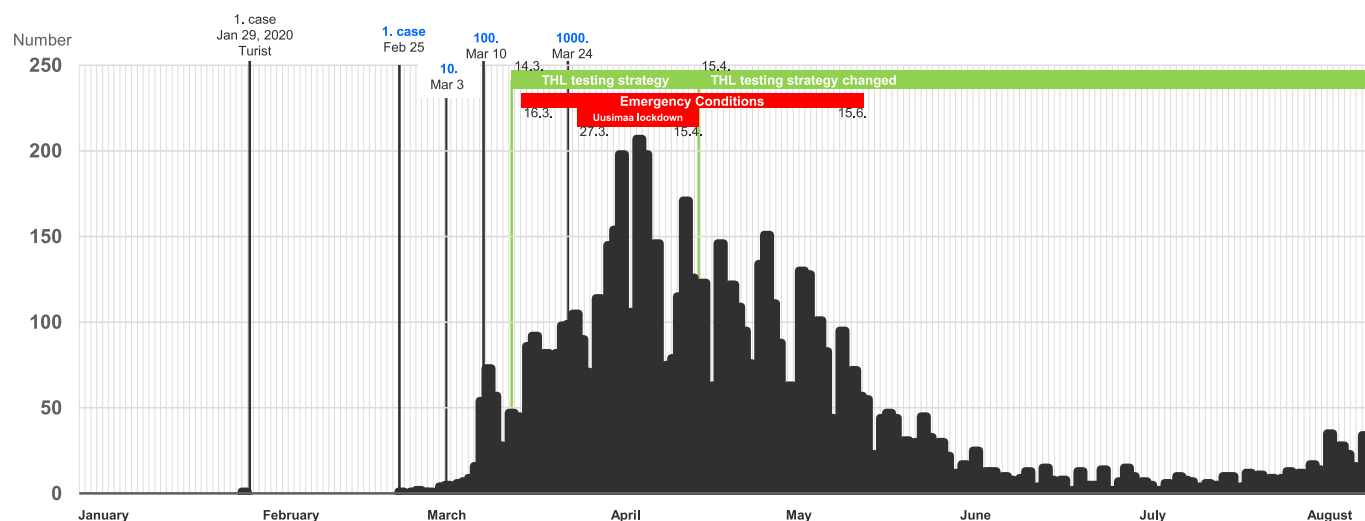


Fig. 1. Daily number of laboratory-confirmed COVID-19 infections by laboratory specimen sampling date reported to the Finnish national Infectious Disease Register by August 10, 2020.

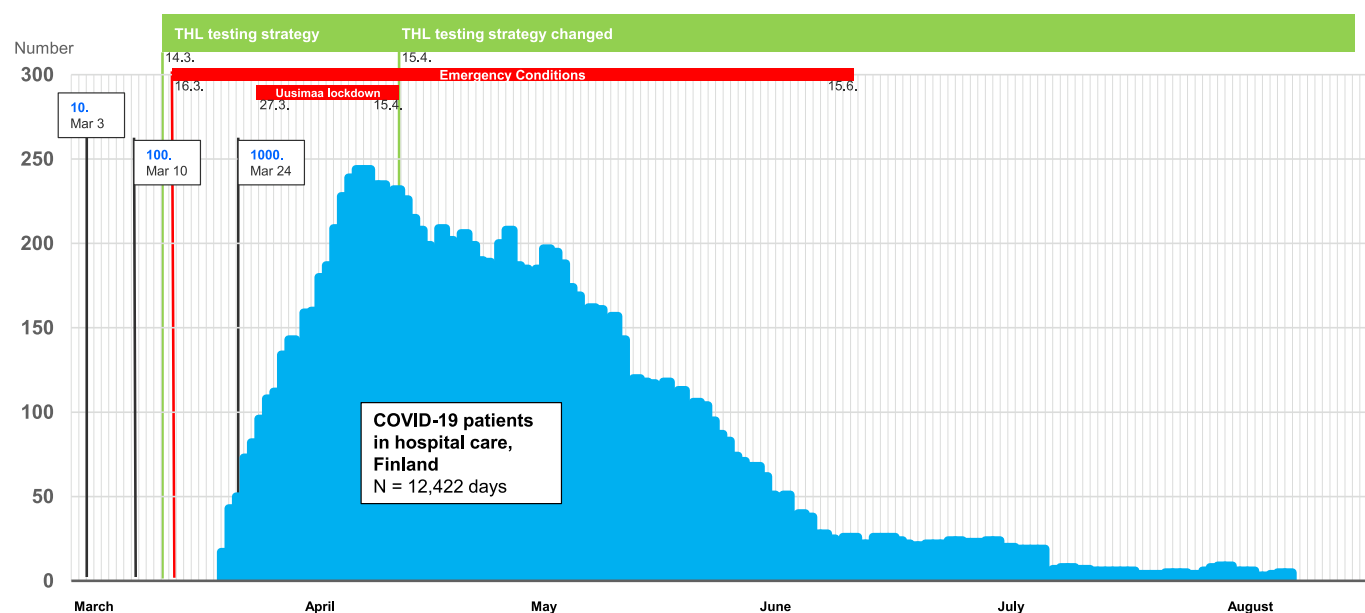


Fig. 2. Daily number of laboratory-confirmed COVID-19 infection patients in hospital inpatient care wards (blue) by August 10, 2020 in Finland.

agency powers (the section 23 of the Constitution, and the Emergency Powers Act). Different policies have been implemented in Finland widely to stop the spread of the COVID-19 pandemic (Table 2).

Much of Finland's response to the COVID-19 pandemic has been based on legal measures other than actual emergency powers, namely on recommendations to the public and legally binding orders in accordance with e.g. the Communicable Diseases Act or through "soft" recommendations to the public and employers.

The Government took stricter measures to stop the spread as the epidemic situation evolved by introducing "harder", unilateral, decisions by public authorities. When COVID-19 was listed as a generally hazardous communicable disease by the Government Decree in February, the authorities were given special powers as included in the Communicable Diseases Act. Under the Emergency Powers Act municipalities and hospital districts could also deviate from the time limits for non-urgent healthcare, except for the assessment of the need for care.

Regarding the impact of policy intervention in Finland it is estimated that incidence of COVID-19 decreased by 13% on the average in relation to physical distancing interventions. The implementation of lockdown early in the epidemic compared to many other countries was also obviously associated with the incidence of COVID-19. No evidence of additional benefits has been found from the closure of public transport when four other physical distancing measures (school closures, workplace closures, restrictions on mass gatherings, and lockdown) were in place [11]. Table 3. shows the dates of the first laboratory confirmed COVID-19 infections, legally activated restrictive measures infectious disease in Finland and selected EU Member States [12–14].

4.2. Practices aimed to curb spread, and to aid prevention and cure

THL has given general advice on hand hygiene, physical distancing and respiratory etiquette. THL has also produced materials for use by public health officials functioning at national and lo-

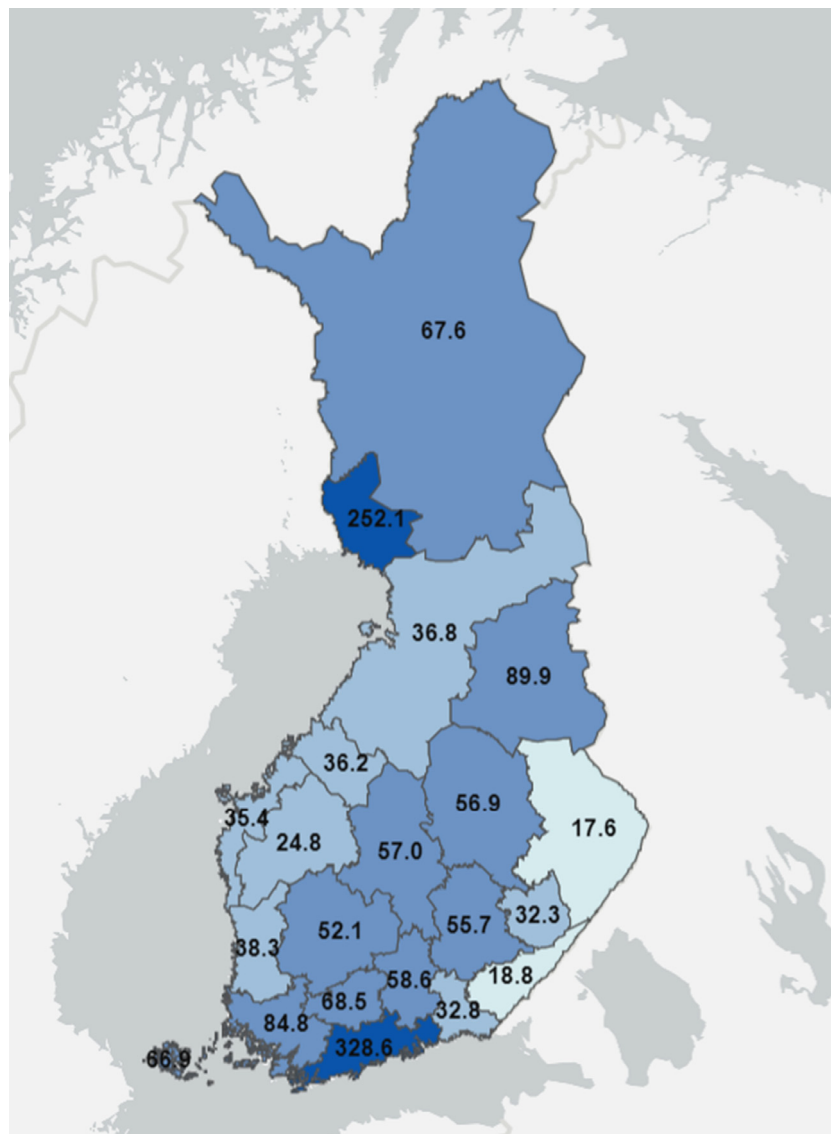


Fig. 3. Incidence of COVID-19 (confirmed cases) by August 10, 2020 in Finland.

cal level. THL updates its website daily which has a Q&A section and general information about the disease, prevention and care for the public, health care professionals as well as for the media [1].

The Ministry of Social Affairs and Health (MSAH) and THL have provided guidance for social- and healthcare providers. Also the Finnish Institute of Occupational Health (TTL) has provided guidelines on preventing coronavirus infections in the workplace for all workplaces and workers [15].

One of the areas the guidance has been given and changed is the use of PPE in health and social care to protect the clients. Those who work in close contact with clients in 24 h social care units and home services are mandated to wear masks [16]. The aim is to protect clients with increased risk to serious COVID-19 infection. Oral health care workers need to have the highest level of PPE [17]. There has been considerable debate about the use of face masks. For the general public THL and MSAH have stated that fabric face masks can be used in places where it is not possible to avoid close contact [1]. In mid-August 2020, after new increase in the COVID-19 incidence, THL released a firmer recommendation on the use of face mask in public transport as well as in cases with suspicion on the in-

fection, such returning to Finland from high incidence country [18].

4.3. Testing strategies and implemented technology

Testing and tracing has been an important element of the Finnish strategy along the way but its role has been emphasized since May 2020 when the government stated that Finland adopts a “hybrid strategy” – as they call it – referring to a move from extensive restrictive measures to enhanced management of the pandemic. Alongside the controlled dismantling of restrictive measures, the strategy focuses on testing, tracing, isolating and treating [1,19].

Public health measures are the responsibility of local and regional authorities. In the public sector, symptomatic patients are tested in drive-throughs that are linked to hospitals. The public sector has bought testing capacity and drive-through testing also from the private sector. Private providers have provided testing services both to the public sector as well to individual citizens paying themselves [1].

Contact tracing is also done by local and regional authorities and decentralized tracing has been successful. In most parts of the

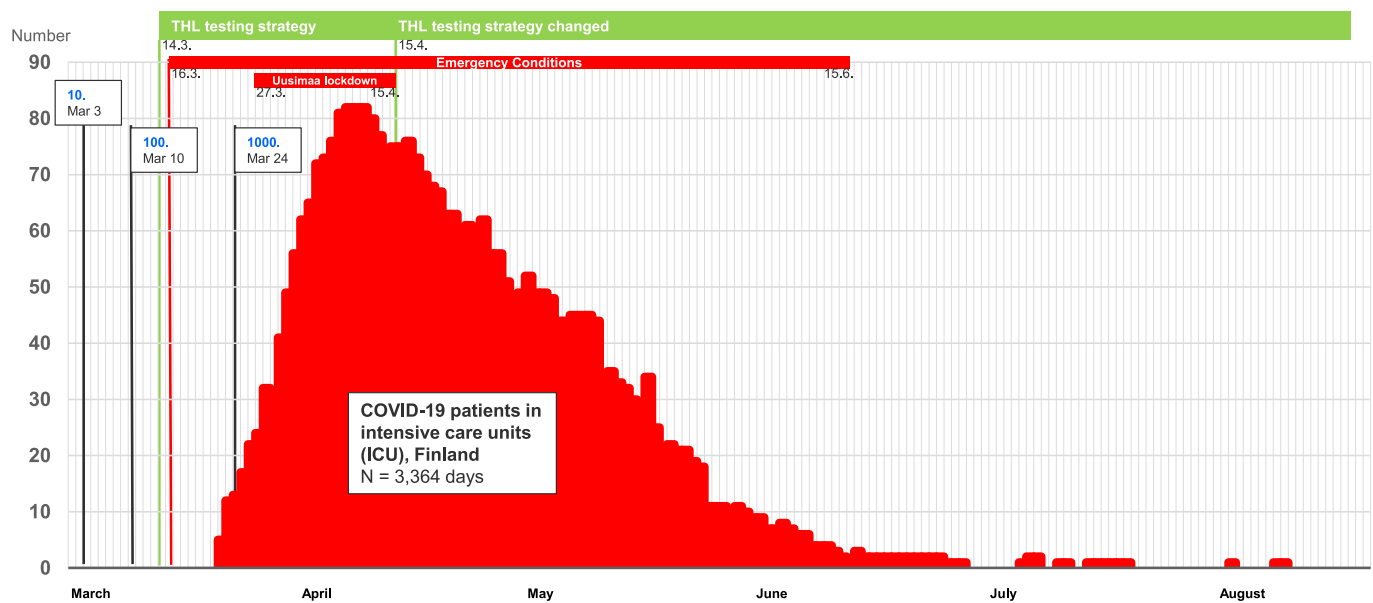


Fig. 4. Daily number of laboratory-confirmed COVID-19 infection patients in intensive care units (ICU) by August 10, 2020 in Finland.

country the spread of the virus has potentially been limited due to effective tracing when cases have occurred. THL has collected a pool of voluntary trackers who can be used to coordinate resources in case areas in Finland lack tracing capacity [1].

Testing criteria has changed along the way and there have been regional differences in testing. National steering has been the responsibility of THL. In the beginning of the pandemic probable cases and their close contacts were tested. However, on March 12th, due to limited testing capacity, THL issued guidance on focusing testing on patients with severe respiratory tract infection symptoms and on elderly and social and health care personnel. When capacity allowed, testing was also performed on people with mild symptoms, those returning from abroad and vulnerable patient groups with an underlying condition and to people over the age of 70 [1]. Hospital districts and other actors, for example the private sector, could test other suspected cases of COVID-19 if they deemed it necessary.

On April 15th, with increased testing capacity, THL and hospital districts redefined the official guidelines to promote more aggressive testing and identification of all symptomatic COVID-19 patients, including those with mild symptoms. As of 10 June, no untargeted testing of the asymptomatic population is conducted but the testing criteria are loosened and everyone with even mild symptoms and those suspected of being infected are tested at the physicians' discretion [1].

The current testing capacity (August 2020) is over 13 000 samples per day. Even though testing capacity has been increased, to date full capacity has not been in use. The waiting-times to tests and for results have increased during the past month. Currently the waiting-time to test can be several days which can also be the case for the results. The reasons for this relate to both supply and demand of the tests. On the supply side the lack of capacity relates to shortage of staff as well as holiday season in Finland. On the demand side, losing many of the restrictions, start of the school year as well as day care have increased the number of flu cases which, under current guidelines, all need to be tested. Children with minor flu, for instance, are not allowed to school or daycare without a negative test result. Fig. 5 shows the daily numbers of COVID-19 laboratory tests by laboratory specimen sampling date reported to the Finnish National Infectious Disease Register by August 10, 2020.

4.4. Using health technology

The COVID-19 digital self-assessment tool Omaolo (omaolo.fi/en) is used nationwide and it is available in Finnish, Swedish and English. Municipalities and hospital districts direct people to contact Omaolo on their websites [20]. This e-questionnaire enables equal service regardless of time and place of residence. In practice, if a person suspects that they have COVID-19 infection, they are advised to make a COVID-19 symptom assessment using the Omaolo website. If a person is deemed, according to their symptoms, as potentially having COVID-19 infection they are advised to contact their own health centre. The public have a possibility to answer the self-assessment questionnaire anonymously or based on strong authentication. However, all answers are gathered in the website application log. Those who answer the questionnaire via strong authentication can send their assessed questionnaire results further in electronic format to their respective public primary healthcare center. The patients who have sent their questionnaire to a health care provider can be then contacted by a nurse or a physician.

For Omaolo, some 600,000 questionnaires have been assessed since March 2020. Among the 60–69-year old, the responses were 7% of all the self-assessments and 9% of the COVID-19 infections whereas 13% in the general population. The proportions were 3%, 12% and 16%, among those at least 70 year old people, respectively [21].

Good practices related to COVID-19 related measures implemented in the municipal sector have been collected to an open access Innokylä website moderated by THL (innokyla.fi) in order to share information between municipalities. In addition, the recently launched national emergency assessment medical Helpline 116117 has been used. The service currently covers 74.5% of the residents. There are also some early experiences of using other health technologies and applications with COVID-19 epidemic.

To support contact tracing the Parliament has enacted amendments to the Communicable Diseases Act that enable the development of a system for contacting people who may have been exposed to COVID-19. The application (Koronaviilkku) would be used to alert people who have come into contact with someone who have tested positive and people could send information on their potential exposure to the healthcare service and quickly receive in-

Table 2

Policy Interventions of COVID-19 in Finland.

Categorisation	Sub-category	Level	Legal basis	Definition/Example
Policy Interventions to contain the spread of the virus	Pre-peak and Peak	Weak (non-binding recommendation)	No	General guidance persons over 70 years of age must refrain from contact with other persons to the extent possible (quarantine-like conditions). Face mask voluntary for public. The public strongly advised for not spending unnecessary time in public places (until 31 st May) Self-quarantine after traveling abroad. Private-sector employees were instructed to work from home if their duties allow.
			Ordinary laws (Communicable Diseases Act etc.)	Sports, museums, libraries, swimming pools, youth centres and clubs, day care services for the elderly, rehabilitative work facilities and workshops closed. Visits to housing services for the elderly and other at-risk groups were prohibited. Public-sector employees were instructed to work from home if their duties allow.
		Moderate (binding, no punishment measures)	Ordinary laws	Classes or entire schools were closed if teachers or students were infected. Public events and gatherings with more than 10 people banned, changed from 1 st June to 50 people.
			Emergency powers (Emergency Powers Act etc.)	The premises of all educational institutions closure. (from March 18 th to May 13 th).
		Strong (binding, punishable measures)	Ordinary laws	Restaurants closed (take away allowed) (until 31 st May 2020). Persons tested positive for COVID-19 in isolation either at their homes or if they require hospital care, at a hospital. All exposed persons in quarantine for two weeks.
			Emergency powers	Lockdown of the capital Helsinki and the region of Uusimaa around it, from the rest of the country for three weeks
	Post-peak	Weak	No	Social distancing measures in terms of washing hands, working from home if possible (in areas with moderate or high COVID-19 prevalence). Face mask is voluntary for public. The use of mask is recommended in public transport (from 13th August). Self-quarantine after traveling abroad in high and moderate risk countries. The public strongly advised for not spending unnecessary time in public places (before summer).
			Ordinary laws	Primary schools and gyms reopened (14 th May). Re-closing schools if cases founded. Public events and gatherings inside with more than 50 people were banned until early June. More than 500 people public events outside were prohibited until July 31 st .
		Moderate	Ordinary laws	Restaurants re-opening. In first phase (June) inside sitting places 50% coverage filling allowed, buffet not allowed. In second phase (after June) full re-opening.
				Persons tested positive for COVID-19 in isolation either at their homes or if they require hospital care, at a hospital. All exposed persons in quarantine for two weeks.
Policy Interventions for prevention and cure	Pre-peak and Peak	Weak	Ordinary laws	Increasing the testing and tracing capacity
		Moderate	Ordinary laws	Additional PPE purchased by the National Emergency Supply Agency (NESA) and hospital districts and municipalities themselves. Provisional hospitals to expand the capacity of the Helsinki area health system.
	Post-peak	Weak	Emergency powers	Health care resources prioritization (urgent and non-urgent care, ventilators, masks, PPE, ICU nurses, retired professionals). Non-urgent care cancelled to scale up the ICU capacity.
			Ordinary laws	Increasing the testing and tracing capacity. Increasing testing in airports, harbours and land borders (from August 13th). Increased the availability of PPE. Recommendation to re-start non-urgent care.
		Moderate	Emergency powers	Possibility to re-start health care resources prioritization.

formation on actions that they need to take. The use of application would be anonymous, free and voluntary. The application is due to be fully available in September 1, 2020 [1,22]. Table 4 presents the technology that has been implemented during the pandemic.

4.5. Policies aimed to contain the economic impact

The regular state budget for the year 2020 included some funding for preparing for large infectious disease outbreaks and other unforeseen events. In addition, the decentralized Finnish health system and care of the elderly in municipalities and hospital districts have their own financial reserves and contingencies. However, it was soon realized that the planned reserves

were not enough for the COVID-19 pandemic needs and the Government submitted a supplementary budget proposal of €398 million in March 2020. It focused on covering expenses incurring from the COVID-19 pandemic and on easing the financial situation of firms by emergency measures. The proposal contained also a substantial increase (€200 million) for unforeseen events.

Since March, the Government has issued three other supplementary budgets. The four supplementary budgets totals €9.6 billion of additional spending, i.e. 17% increase in Central Government spending from that planned in December 2019. As the first supplementary budget concentrated on emergency measures, the latter three contained also a strong economic stimulus package as well

Table 3

The dates of first laboratory confirmed COVID-19 infections, legally activated infectious disease and national distancing restrictions by some EU Member States.

Country	1st Case of COVID-19		Infectious disease		National restrictions	
	Week	Date	Date	Days I	Date	Days N
Bulgaria	10	8.3.2020	13.3.2020	6	25.3.2020	18
Hungary	10	7.3.2020	11.3.2020	5	11.3.2020	5
Slovenia	10	4.3.2020	12.3.2020	9	16.3.2020	13
Latvia	10	2.3.2020	13.3.2020	12	13.3.2020	12
Portugal	10	2.3.2020	18.3.2020	17	22.3.2020	21
Estonia	9	27.2.2020	12.3.2020	15	13.3.2020	16
Denmark	9	27.2.2020	11.3.2020	14	17.3.2020	20
Finland	9	26.2.2020	14.2.2020	-11	17.3.2020	21
Poland	9	26.2.2020	13.3.2020	17	15.3.2020	19
Croatia	9	25.2.2020	11.3.2020	16	19.3.2020	24
Belgium	6	4.2.2020	27.3.2020	53	13.3.2020	39
Sweden	5	31.1.2020	16.4.2020	77	(-)	(-)
Italy	5	31.1.2020	31.1.2020	1	21.2.2020	22
Germany	5	27.1.2020	25.3.2020	59	13.3.2020	47
France	4	24.1.2020	23.3.2020	60	23.3.2020	60

Week = Calendar week, year 2020.

Days I = [Date: Infectious disease] - [Date: 1st Case] + 1.

Days N = [Date: National restrictions] - [Date: 1st Case] + 1.

(-) = Data not available.

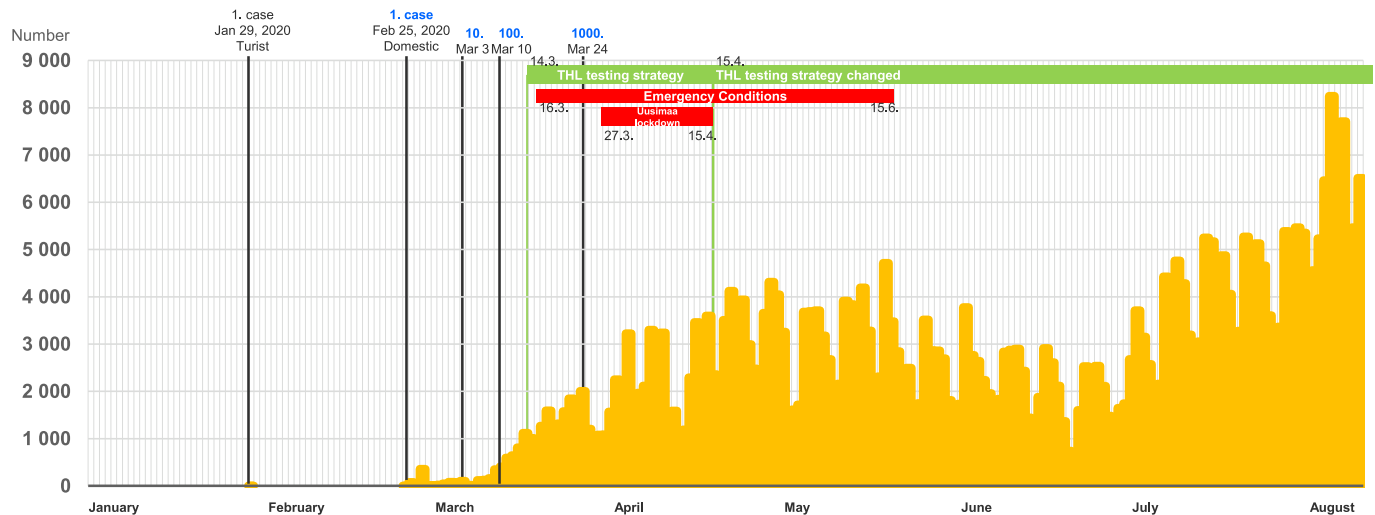


Fig. 5. Daily number of COVID-19 laboratory tests by laboratory specimen sampling date reported to the Finnish national Infectious Disease Register by August 10, 2020.

Table 4

Technology solutions implemented.

Health Technology Announcement or use of health technology	Technology	Category	Description
Announcement or use of health technology	Testing (Is about the accuracy and reliability)	Minimal	National emergency assessment and advice number (116117).
		Medium	National COVID-19 digital self-assessment (https://www.omaolo.fi/en).
		Significant	Drive-through testing in public and private healthcare.
	Tracing (Degree of invasiveness of the technology)	None	The nucleic acid test (PCR).
		Minimal	Serological test.
		Medium	Contact tracing not required (since March 12 th)
		Significant	Contact tracing has continued in many regional and local governments. Capacity for contact tracing in overall about 400.
	Treating (The extent of advancement of technology)	None	An online course of contact tracing (THL, Tampere University and University of Eastern Finland).
		Minimal	The course is targeted for health and social care personnel and students.
		Significant	THL has responsibility for oversight on contact tracing, but it has so far not made public oversight or surveillance on numbers or capacities on contact tracing.
Announcement or use of health technology	Testing (Is about the accuracy and reliability)	Minimal	Mobile application is been prepared.
		Medium	-
		Significant	Not specific technology implemented.
		Significant	Website created by THL to collect good practices with COVID-19 (Innokyla.fi).

as substantial increases for social spending. Increased spending became possible as the Government decided not to honor spending limit, set in the Government Program, in 2019.

In the Finnish public finances this is extraordinary as supplementary budgeting increases annual expenditure normally less than one per cent. Moreover, the supplementary budgets contained also substantial increases in State Guarantees, capital funding for Government agencies and enterprises as well as authorizations for future investment expenditures, which will not materialize as expenditure this year. Increased expenditure and plunge in tax income imply that Central Government borrowing will increase from €2 billion to near €20 billion this year.

5. Health care system response

After the declaration of the Emergency Powers Act in March, the MSAH instructed all emergency care services to streamline their activities and hospitals to increase their ICU capacity. This capacity increase was, for instance, done by converting operation theatres and recovery areas into intensive care units. Hospital districts also started to train surgical staff and ward staff in treating COVID-19 patients and working at ICUs. These actions meant scaling back elective surgeries and other non-acute care. At the time of writing hospital districts and municipalities have started to expand non-acute care activities after the epidemic situation has evolved and it has become clear that the overload in the care system has not been an acute threat – at least so far [1].

The number of ICU beds and ward capacity varies across the country. The overall ICU bed capacity has been estimated at 300 and the number of intensive surveillance beds is about 150–200 [23]. Authorities estimated that the capacity can be doubled if needed but there are no exact numbers publicly available. The Helsinki-Uusimaa hospital district responsible for the capital region and with most COVID-19 patients so far in Finland has evaluated that it has 84 ICU beds that can be dedicated to COVID-19 patients. This could be further increased to 150 beds and even 220 beds if necessary. In April, a statement was issued on the evaluation of the sufficiency of ICU capacity outside the Helsinki-Uusimaa region concluding that based on the contemporary understanding of the development of the epidemic the increased capacity should be sufficient to meet the needs of COVID-19 patients across the country [24].

In the context of the Emergency Powers Act there is a section on the work obligation for trained health care staff (also the retired under 68) that could be applied to secure a sufficient number of staff in the event of overload in the service system. In March 2020, the Government issued a decree to implement the obligation of healthcare professionals to carry out work laid down in the Emergency Powers Act [25]. However, obligation to work should be the last measure to safeguard the services and at the time of writing, the powers laid down in the decree have not been applied. The sufficiency of workforce has been secured through other means, such as reorganizing work, purchasing services from the private sector, and recruiting backup employees [26].

Despite scaling back non-urgent services both at specialized care and in primary level services the municipalities are still responsible for necessary healthcare and medical treatment. This means that the care of the residents must be ensured even under emergency conditions. MSAH has issued guidance stating that in a difficult epidemic situation, the priority of urgent care for patients should be emphasized, but that non-urgent treatment must always be provided if deemed necessary for the patient's health status [27]. Emergency powers were used to allow municipalities and hospital districts to deviate from the time limits for non-urgent healthcare, except for the assessment of the need for care [28].

It has been reported that the number of outpatient care appointments has decreased substantially (Fig. 6.) and this has not been compensated by the increase in digital appointments [29]. This has raised concerns on potential increase in unmet care needs and the negative effects of postponing treatment. In April 2020, THL published a rapid assessment on the effects of COVID-19 epidemic on the population's service needs, the service system and the economy [30]. According to the assessment, the range of services has been narrowed and the service forms have been altered to emphasize remote services. For this reason – and also because of patients' fears – many necessary services requiring contact have not been realized, such as follow-up visits for people with long-term illnesses. Also, the waiting times to non-urgent specialized care have substantially increased in all hospital districts (Fig. 7.), even though the acute threat of the overload of the health care systems has potentially been realized only in the capital region. This has been suggested to exacerbate potentially the population's disease load, to prolong treatments, and to increase treatment costs after the epidemic has come to an end [30].

The epidemic has also affected the sales and purchases on medicine. On week 12, which was the week when the state of emergency was declared, the purchases of prescription medicine peaked in general (Fig. 8.) and especially in medicine for respiratory diseases (ATC R) and in some other commonly used medicine groups. The purchases of anti-infectives for systemic use (ATC J) seem to have declined since the week 12 (Fig. 9.) [31]. On 14th March, the Social Insurance Institution of Finland (Kela) reported issues with availability of pharmaceuticals [32] and on 16th March the Finnish Medicine Agency Fimea advised against overstocking of medicines [27,33]. On 18th March, the Government restricted the sale of medicines, goods and services used in healthcare services [34]. The aim was to ensure the availability of medicinal products and essential medical supplies as well as the functioning of the distribution chain in Finland in the exceptional conditions caused by the coronavirus.

6. The economic consequences of COVID-19 in Finland

Many analysts have suggested that the COVID-19 pandemic could be economically more drastic than the Financial Crisis of 2008–2009. In the Finnish context, the economic shock of COVID-19 is often compared with the deep recession of the early 1990s, which included a domestic banking crisis and large export losses.

The pandemic affects a small open economy, like Finland, via several channels. First, it may affect economic sentiment and thus decrease consumption and investments. Second, the Government restrictions have curbed some economic activities effectively. The third effect comes via international trade and financial markets and reflects global developments. Moreover, the pandemic affects public finances drastically and in the long term as public indebtedness increases fast. The main effects stem from decreased economic activity and consequently diminished tax incomes as well as the measures aiming at compensating economic losses and to stimulate the economy back to the path of growth (see Section 4.5).

Considering the relative importance of foreign trade and the relatively well controlled pandemic, one could assume that the international trade and financial market effects will dominate over the domestic pandemic and the Finnish Government actions. The value of Finnish merchandise exports declined on average 17 % in time period from January to May of 2020 from the previous year [37], very much due to weakening demand conditions in the countries relevant for Finnish exports. The stringent situation in other European countries is likely to strongly influence statistics also after this time period.

In August 2020, it is too early to estimate reliably the cost associated with each channel of influence. In addition, in the long

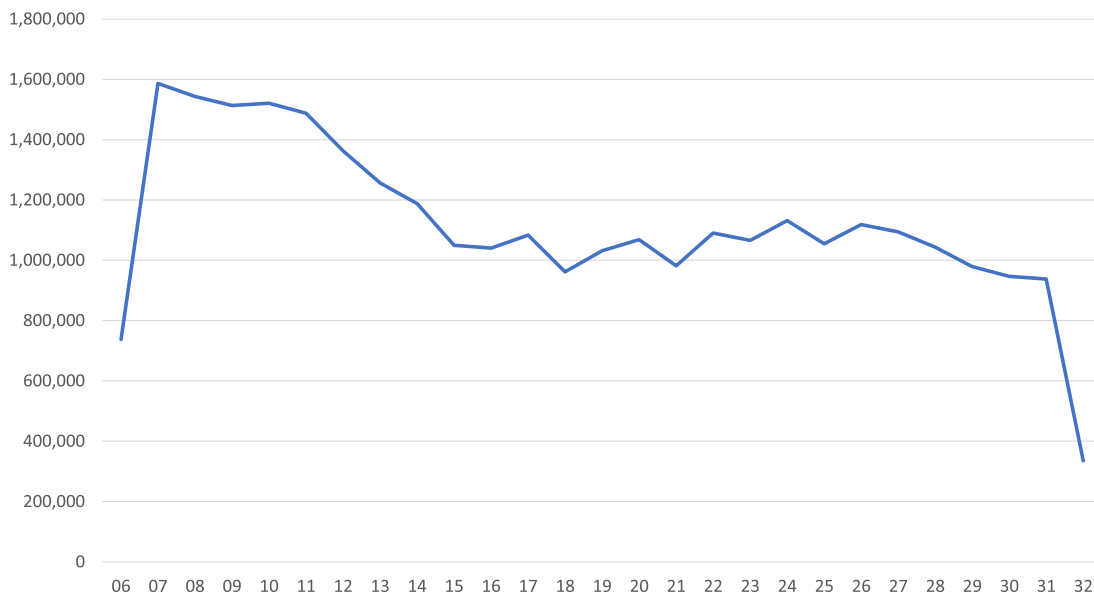


Fig. 6. Ambulatory care visits in Finland in 2020, weeks 1-32.

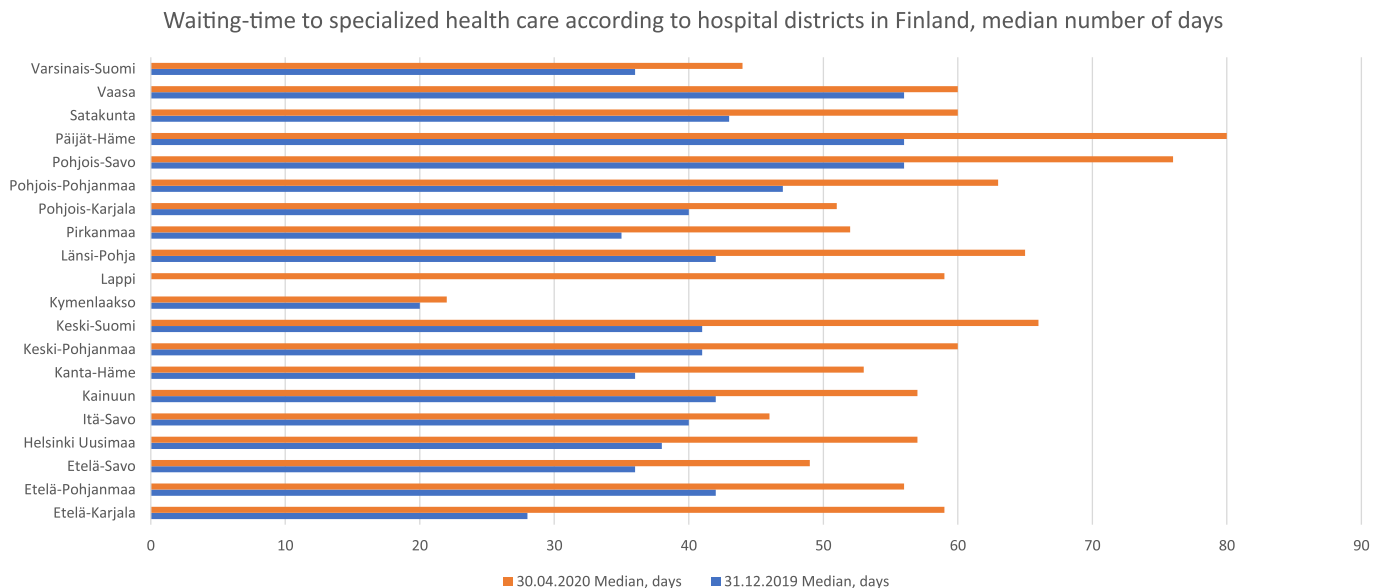


Fig. 7. Waiting-time to specialized health care according to hospital districts in Finland, median number of days.

run, it will be very difficult to estimate how much economic behavior was affected by the epidemic and how much economic behavior was affected by Government actions. As there is very little conventional reliable statistical information available to date, there have been important attempts to create unconventional statistics, e.g. through using Big Data. In the following subsections, we review information available in August.

6.1. March 2020: A turning point for the Finnish Economy

The first economic effects of the pandemic emerged already before it had really started in Europe. As China's exports contracted 17% in January-February compared with last year, global production chains were affected e.g. the European car industry reported shortages of car parts. As Chinese ports were closed, Finnish exporters reported that there was shortage of sea containers in the harbors. It is still very difficult to see how much the supply chain

effect explains the weakening of the economic situation in Europe and particularly in Finland.

The sharp decline of the Finnish economy started in March 2020 when GDP contracted by 5.4 % from the previous year. According to preliminary figures, the GDP decline was 4.9 % in the second quarter of 2020 [37]. In addition, official Employment Statistics begun to show a decline in employment and an increase in the number of unemployed persons in March. However, the changes were limited [37].

Although the official unemployment figures did not capture remarkable change, the number of new spells of furlough increased rapidly in mid-March and the numbers exploded few weeks later. Many of the furloughs initiated are already terminated, but the number of furloughed persons was about 136 000 higher at the end of May than it was in February. This corresponds to 5% of the labor force. Other unemployed job seekers have increased by 46 000 (almost 2% of the total labor force). Since that the num-

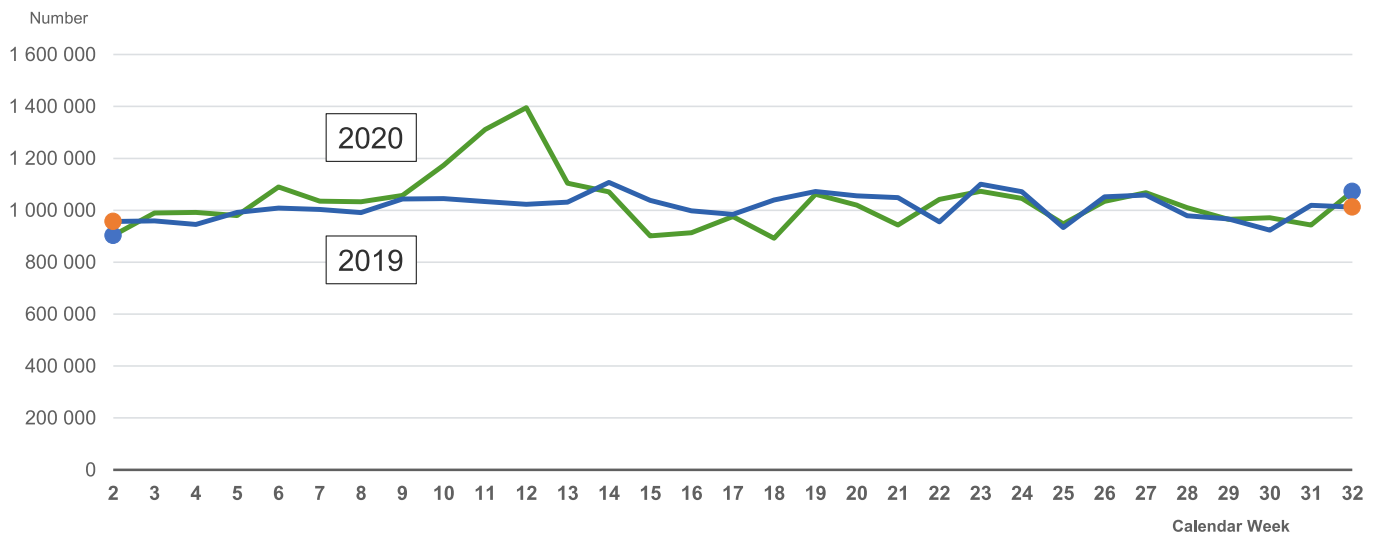


Fig. 8. Number of prescription medicine purchases in community pharmacies per week in 2019 (blue) and 2020 (green) in Finland, all ATC groups, weeks 1–32 [35].

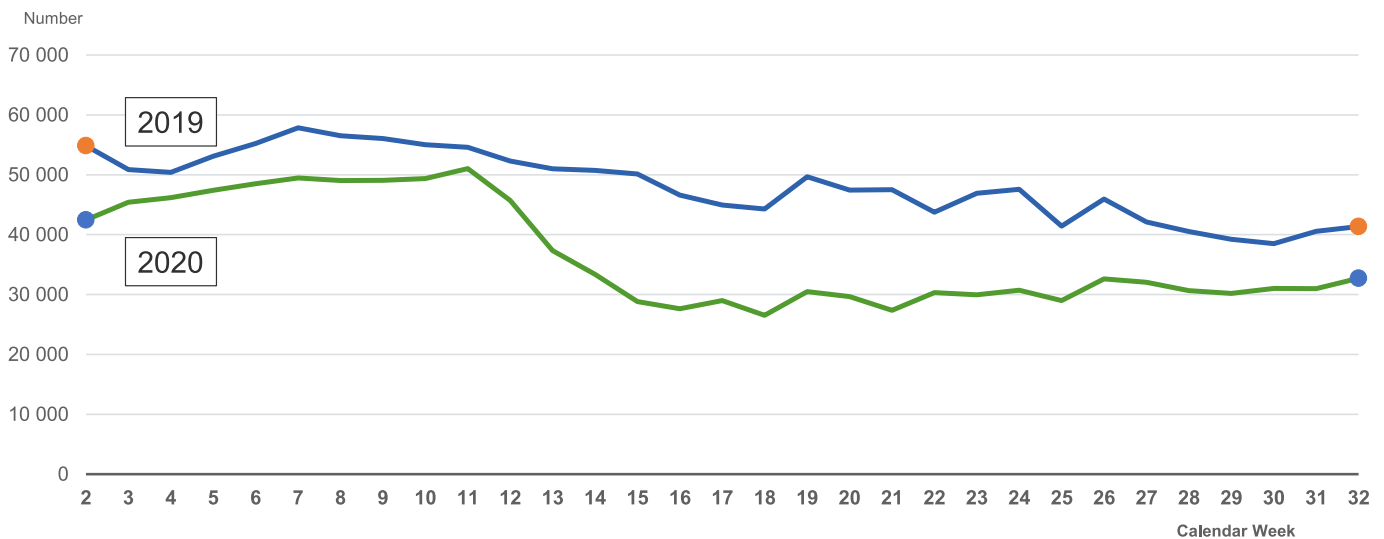


Fig. 9. Number of prescription medicine purchases in community pharmacies per week in 2019 (blue) and 2020 (green) in Finland, ATC group J (anti-infectives for systematic use), weeks 1–32.

ber of furloughed persons has declined remarkably, but number of other unemployed persons increased somewhat. The Finnish furlough system seems to work well in protecting both employees and firms as labor costs are shifted to the Government in this way. However, the employment situation remains very fragile, as the Ministry of Employment and Economy reports that 20% of employers have been or are under collaborative consultations for downsizing or reorganization preceding furloughs [38].

6.2. Leading indicators information is difficult to interpret

Information regarding furloughs and expectations hints that the sharp GDP decline could have ended in the beginning of the third quarter of 2020. The consumer confidence index dropped drastically in April and an all-time-low Consumer Confidence Balance was recorded. Consumer expectations improved slightly in May but turned already relatively optimistic in June and July [36,39]. Also business expectations deteriorated strongly in April, but has recovered somewhat since that [41].

In theory, financial markets should mirror expectations. However, one of the great puzzles of the pandemic is the relatively

mild financial market reactions. For example, the US stock market has recovered quite well from the initial hit. In the beginning of August, S&P and Dow Jones indexes are about 5 % higher than they were in early January and are, in fact, about 20 % higher than a year ago. The global puzzle is visible in Finland also. In the beginning of August, Helsinki OMX25 index was approximately at the same level than it was in early January and about 10 % higher than a year ago. However, stock markets both in the USA and Europe mirror the extremely supportive monetary policy, which has continued in Europe for already over a decade. The health of the real economy could be much worse than the indexes indicate.

6.3. Big Data and other nonconventional statistical information sources

Alarming news and the drastic increase in furloughs in late March created a strong demand for economic information. As there is a substantial publishing lag in conventional statistics (e.g. National Accounts), there has been several initiatives to collect, combine and analyze big data and other nonconventional information. ([40]

Although nonconventional data sources are difficult to use to predict how large macro aggregates may evolve, they have created important observations [36]: The number of entrepreneurs registered as unemployed is tenfold compared to 2019 and their share of all unemployed was 23% at the end of April. This is likely driven by the decision of the Finnish government to allow entrepreneurs to register as unemployed. Unemployment and furloughs concentrate in different service sectors, including logistics and transport. Contrary to the normal situation, new unemployment and furlough spells concentrate onto women, especially young women. There is less differentiation according to education levels and the earnings distribution of those losing their jobs has more middle-income earners than in previous crises.

6.4. Economic forecasts

As official statistics for the second quarter of 2020 are not yet available and information from leading indicators are confusing, one could argue that economic forecasts published by Finnish authorities, international organizations and various private agencies are perhaps the best guess of the situation at this stage. However, the usefulness of the published forecasts can be evaluated only afterwards.

The Finnish Ministry of Finance (MoF) published its Summer Forecast in June [42]. According to the forecast, GDP contracts 6 % in 2020, but returns to normal in 2021. Unemployment increases from 6.7% in 2019 to 8.5 % in 2020. This will deepen General Government deficit by 7 percentage points and turn Public Debt into an increasing trend. MoF's forecast is based on the assumption that there is no second wave in the epidemic and restriction can be permanently lifted after three months. The OECD has estimated that the extending the restrictions by one month will cost about 2% of GDP as lost output. Accordingly, the effects on the labor market and public finances would be bigger.

According to the Bank of Finland's latest forecast (June 9), GDP will contract 7% in 2020 [42]. Other forecasts, published by several independent institutions, are as pessimistic as the official ones [43].

7. Conclusions

In terms of the spread of the COVID-19 pandemic and the number of infected and dead, Finland's coronavirus strategy has so far been successful. For instance, in June 2020 it was estimated that if the age-standardized mortality from COVID-19 in Finland had been similar to that in Sweden, Finland would have experienced a number of fatal cases nearly eight times higher than currently [44]. The success may have been a result of a combination of measures to tackle the outbreak but – also a matter of good luck. The epidemic landed in Finland late compared to many other countries which provided the authorities and politicians time to learn from the experiences from other countries. It seems that the restrictive measures were put in place early enough and the instructions on physical distancing have been obeyed well. The local actions by municipalities, hospital districts and regional offices of central government have also been effective.

At the same time, however, the measurement of “success” is always relative, because of the unintended consequences of the epidemic control and restrictive measures. At the time of writing the acute pandemic stage is past in most areas of the country – at least for now – and it has become clear that many of the precautions taken by health care providers turned out to be slightly too extensive. It is difficult to say whether scaling back non-urgent care could have been done to lesser extent. However, what seems certain is that people have refrained from seeking care which may result in increasing unmet care needs and repressed service demand.

This implies a need for careful monitoring and surveillance, and special attention to vulnerable groups such as those people with pre-existing mental health conditions, those with precarious work conditions, recent migrants, children and older people, to name but a few.

Some restrictions, such as school closings, most probably have negative impacts on health, wellbeing and the economy, which may have outweighed the benefits of the restrictions. However, it is not possible to make far reaching conclusions because the costs and benefits of the restrictions have not been analyzed carefully yet. A main challenge in analyzing the economic consequences of the pandemic is the difficulty in disentangling the effects of the domestic epidemic and the effects of the policies of the Finnish Government as these took place simultaneously. Available information supports the conclusion that the economic consequences could be drastic in Finland, albeit less dramatic than in large industrial countries, at least in the first phase of pandemic.

In international comparison, the Finnish health system looks highly uniform and is based on local government i.e. municipal financing and organization. However, the regional responsibility for public health functions is decentralized and fragmented between municipalities, hospital districts and regional offices of central government. While so far the decentralized actions have been successful, the steering of the system may prove difficult during more severe crises. For the COVID-19 epidemic, the challenge has materialized in, for instance, purchases of PPE, implementation of testing and providing non acute services for the vulnerable groups. On the other hand, decentralized public health functions have made it possible to engage in active public health actions at local level. This has been successful in most of the municipalities in Finland. At the same time, it needs to be highlighted that the health system, in general, has managed to care for the patients with severe COVID-19 infection with good results.

It is possible, even probable, that COVID-19 pandemic has accelerated the development of digital health services and telemedicine in various parts of the Finnish healthcare system. The Helpline general advice center and moreover the digital self-assessment tool such as Omaolo may have played an important role in providing people self-assessment and potentially prevented unnecessary visits to healthcare facilities. Finland has in place a comprehensive national centralized integrated and shared data system services for healthcare and social welfare services, community pharmacies and citizens. Based on this development of interoperable infrastructure, it was possible to develop a digital self-assessment COVID-19 online questionnaire service for all free-of-charge. The Omaolo service was launched within a week following the government decision. All public and many private healthcare providers refer respiratory infection patients first to the open and accessible online service before any other assessment. The online service is a CE-marked medical device that specifies the monitoring of COVID-19 epidemic in Finland.

The overall resilience of the Finnish society has been comparatively high, even though the COVID-19 pandemic will have far-reaching systemic effects on the entire society [45]. At the time of writing the impact of the pandemic is reflected in changes in the behaviors of the people and many organizations. Extensive measures have been taken to help the society to cope with the effects of the pandemic. Opening the society and loosening restrictions step by step are seen as paramount for the economy and for the general wellbeing of Finnish residents. However, the effects of loosening the restrictions are yet to be seen.

The number of diagnosed patients in Finland has been so far been rather low compared to the population, suggesting that the lockdown had initiated timely. As the spike in COVID-19 cases had come down the government announced in June that it will follow a “test, trace, isolate and treat” strategy also recommended by WHO

[1]. This can be interpreted as a way of avoiding closing down the society and preventing the second wave to occur through active testing.

The approach has come to a test in early August 2020 when, after the lifting of the restrictions, the reported numbers of diagnosed COVID-19 infections have started to increase indicating the possible start of the second wave of pandemic in Finland. Testing capacity was built up along the way and the large-scale restrictive measures can be seen necessary also in terms of being able to increase testing and treating capacity. It is evaluated that most hospital districts would now have better ability to build up ICU capacity and also evaluate the need for scaling back non-urgent care. During the first spike all hospital districts were advised to prioritize COVID-19 care and preparedness which has resulted in long waiting-times to non-urgent care. The combination of having a large number of patients on waiting lists and a potential second wave may cause substantial problems to the resilience of the Finnish health system. The better supplies of protective equipment need to be ensured for possible second wave. The situation is now being remedied through domestic production of protective equipment.

The Finnish legal code has already been amended during COVID-19 pandemic. It has been amended to ensure that it meets better the demands of a second wave. For example to roll out the contact-tracing app, the Parliament approved on June 26th and President ratified already on 4th of July changes to Communicable Diseases Act [46]. However, the experiences drawn on the first half of 2020 provide important lessons in terms of preparations to potential second wave of coronavirus pandemic and the future epidemics in mind.

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References

- [1] WHO. Health system response monitor; 2020. [cited 2020 May 1]. Available from: www.covid19healthsystem.org/mainpage.aspx.
- [2] OECD. Finland: Country Health Profile 2019, State of Health in the EU, OECD Publishing, Paris/European Observatory on Health Systems and Policies, Brussels. 2019. [cited 2020 May 10]. Available from: <https://doi.org/10.1787/20656739-en>.
- [3] Tynkkynen L-K, Keskimäki I, Reissell E, Koivusalo M, Vuorenkoski L, Rechel B, Karanikolos M. Centralising health care administration in Finland – an inevitable path? *Eurohealth* 2019;25(4):29–33.
- [4] Keskimäki I, et al. Finland: Health system Review. *Health system in Transition* 2019;21(2):1–166.
- [5] Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T & Davidson KW. Presenting characteristics, comorbidities and outcomes among 5700 patients hospitalized with COVID-19 in the New York City Area. (Published online April 22, 2020). *JAMA*. doi:10.1001/jama.2020.6775.
- [6] Fei Z, Ting Y, Ronghui D, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet* 2020;395:1054–62.
- [7] Statistics Finland. [cited 2020 May 20]; 2020. Available from: https://www.tilastokeskus.fi/index_en.html.
- [8] Finnish diabetes association. Diabetes in Finland; 2020. [cited 2020 May 20]. Available from: https://www.diabetes.fi/en/finnish_diabetes_association/diabetes_in_finland.
- [9] Finnish Institute for Health and Welfare (THL). Confirmed coronavirus cases (COVID-19) in Finland; 2020. <https://experience.arcgis.com/experience/92e9bb33fac744c9a084381fc35aa3c7>.
- [10] Helsinki: Re-opening schools did not lead to jump in coronavirus infections [Internet]. [cited 2020 Jul 19]. Available from: <https://www.helsinkitimes.fi/finland/finland-news/domestic/17741-helsinki-reopening-schools-led-to-no-jump-in-coronavirus-infections.html>.
- [11] Islam N, Sharp SJ, Chowell G, Shabnam S, Kawachi I, Lacey B, Massaro JM, D'Agostino RB Sr, White M. Physical distancing interventions and incidence of coronavirus disease 2019: natural experiment in 149 countries. *BMJ* 2020;370:m2743.
- [12] European parliament. States of emergency in response to the coronavirus crisis: Situation in certain Member States III. Briefing. [cited 2020 Jun 20]. Available from: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/651972/EPRS_BRI\(2020\)651972_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/651972/EPRS_BRI(2020)651972_EN.pdf).
- [13] European parliament. States of emergency in response to the coronavirus crisis: Situation in certain Member States II. Briefing. [cited 2020 Jun 20]. Available from: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/651914/EPRS_BRI\(2020\)651914_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/651914/EPRS_BRI(2020)651914_EN.pdf).
- [14] European parliament. States of emergency in response to the coronavirus crisis: Situation in certain Member States. Briefing.(Internet). [cited 2020 Jun 20]. Available from: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/649408/EPRS_BRI\(2020\)649408_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/649408/EPRS_BRI(2020)649408_EN.pdf).
- [15] Finnish Institute of Occupational Health. Guidelines for workplaces to prevent coronavirus infection. [cited 2020 Jun 9]. Available from: https://www.ttl.fi/en/fioh-coronavirus-instructions/?_ga=2.253652169.1542173711.1591695076-392167522.1551958650.
- [16] Ministry of Social Affairs and Health (MSAH). Päättös valmiuslain 86 §:n mukaisiin sosiaalihuollon ohjaustoimiin ryhtymisestä; sosiaalihuollon asiakkaiden suojaaminen koronavirustaudilta (COVID-19). 2020. [cited 2020 Jun 9]. Available from: <https://stm.fi/documents/1271139/21429433/P%C3%A4%C3%A4%C3%B6s+valmiuslain+86+toimenpiteet.fi.pdf/331b323e-f82d-a3d8-2fc7-45a7cf94dfee/P%C3%A4%C3%A4%C3%B6s+valmiuslain+86+toimenpiteet.fi.pdf>.
- [17] Finnish Institute for Health and Welfare (THL). Ohje suun terveydenhuollon yksiköille COVID-19 epidemian aikana. 6/2020. [cited 2020 Jun 10]. Available from: <https://thl.fi/fi/web/infektiaudit-ja-rokotukset/taudit-ja-torjunta/taudit-ja-taudinaiheuttajat-a-o/koronavirus-covid-19/ohje-suun-terveydenhuollon-yksiköille-covid-19-epidemian-aikana>.
- [18] Finnish Institute for Health and Welfare (THL). Recommendation on the use of face masks for citizens. [cited 2020 Aug 16]. Available from: <https://thl.fi/en/web/infectious-diseases-and-vaccinations/what-s-new/coronavirus-covid-19-latest-updates/transmission-and-protection-coronavirus/recommendation-on-the-use-of-face-masks-for-citizens>.
- [19] Prime Minister's Office. Government decides on plan for hybrid strategy to manage coronavirus crisis and for gradual lifting of restrictions. 2020:308. [cited 2020 May 14]. Available from: https://vnk.fi/en/article/-/asset_publisher/hallitus-linjasi-suunnitelmasta-koronakriisin-hallinnan-hybridistrategiaksi-ja-rajoitusten-vaiheittaisesta-purkamisesta.
- [20] Omaolo. Do you think you have the coronavirus infection? [cited 2020 May 15]. Available from: <https://www.omaolo.fi/palvelut/oirearviot/649>.
- [21] Jormanainen V, Kaikkonen R, Isosomppi S, Numminen J, Kunnamo I, Salaspuro T, Nordlund H. In: The Finns quickly found the coronavirus symptom assessment online service: those who responded to the Omaolo coronavirus symptom assessment from 16 March to 15 May, 2020; 2020. p. 1–30. Discussion Paper 27/2020. Helsinki: Finnish Institute for Health and Welfare (THL).
- [22] Finnish Government. Legislative proposal for a mobile application for effectively breaking chains of COVID-19 transmission moves forward. [cited 2020 Jun 10]. Available from: https://valtioneuvosto.fi/en/article/-/asset_publisher/1271139/koronaviruksen-tartuntaketjujen-katkaisua-tehostavaa-mobiilisovellusta-koskeva-lakiesitys-etenee.
- [23] STM. Sosiaali- ja terveysministeriön ohje tähtää tehohoidon kapasiteetin nostamisen ja yhtenäistämiseen ensihoidon ja päivystyksen toimintatapoja koronavirusepidemian aikana. [cited 2020 May 15]. Available from: https://stm.fi/artikkeli/-/asset_publisher/sosiaali-ja-terveysministeriön-ohje-tahtaa-tehohoidon-kapasiteetin-nostamiseen-ja-yhtenäistää-ensihoidon-ja-päivystyksen-toimintatapoja-koronavirusepi.
- [24] Finnish Government. Corona & Legislation 2020. [cited 2020 May 25]. Available from: https://valtioneuvosto.fi/en/frontpage?p_p_id=missinglanguageversionnotification_WAR_languageversionnotificationtoolportlet&missinglanguageversionnotification_WAR_languageversionnotificationtoolportlet_missingLanguageVersion=1&decisionId=0900908f8069ff18.
- [25] Finnish Government. Obligation to work in the healthcare sector secures the adequacy of workforce. 2020. [cited 2020 May 27]. Available from: https://valtioneuvosto.fi/en/article/-/asset_publisher/1410877/tyontekijän-työvelvollisuus-turvaa-työvoiman-riittävyyttä-terveydenhuollossa.
- [26] Ministry of Social Affairs and Health. Ministry of Social Affairs and Health instructs municipalities to take proactive measures to strengthen health-care and social welfare services. [cited 2020 Jun 10]. Available from: https://stm.fi/en/article/-/asset_publisher/stm-ohjeistaa-kuntia-ottamaan-kaytoon-ennakoivia-toimia-sosiaali-ja-terveydenhuollon-vahvistamiseksi.
- [27] Ministry of Social Affairs and Health. Municipalities must secure basic-level health and social services and support the most vulnerable under emergency conditions. 62/2020. [cited 2020 Jun 5]. Available from: https://stm.fi/en/article/-/asset_publisher/stm-kuntien-turvattava-perustason-sosiaali-ja-terveyspalvelut-ja-tuettava-heikoim-massa-asemassa-olevia-poikkeusoloissa.

- [28] Ministry of Social Affairs and Health. Hospital districts instructed to reallocate non-urgent care capacity to treatment of patients infected with coronavirus. 6/2020. [cited 2020 Jun 6]. Available from: https://stm.fi/en/article/asset_publisher/sairaanhoitopiireja-ohjeistetaan-siirtamaan-kiireettoman-hoidon-kapasiteettia-koronatapausten-hoitoon.
- [29] Finnish Institute for Health and Welfare (THL). Far-reaching impacts of the COVID-19 epidemic on people's well-being and social and health care services. [cited 2020 Apr 16]. Available from: <https://thl.fi/en/web/thlfi-en/-/far-reaching-impacts-of-the-covid-19-epidemic-on-people-s-well-being-and-social-and-health-care-services?redirect=%2Fen%2Fweb%2Fhealth-promotion>.
- [30] Rissanen P, Parhiala K, Kestilä L, Härmä V, Honkatukia J, Jormanainen V. Effects of COVID-19 epidemic on the population's service needs, the service system and the economy - rapid impact assessment; 2020. Finnish Institute for Health and Welfare (THL). Report 8/2020. 53 pages. Helsinki, Finland.
- [31] Kela. Uusi sovellus lääkekulutuksen seurantaan – lääkkeiden hamstrausta suurimmillaan viikolla 12. [cited 2020 Jun 1]. Available from: <https://tutkimusblogi.kela.fi/arkisto/5254>.
- [32] Kela. Toimitusväli ja koronaviruspandemia. 14.5.2020. https://www.kela.fi/ajankohtaista-apteekit/-/asset_publisher/dSKQeOu7bKqQ/content/toimitusvalit-ja-koronaviruspandemia.
- [33] Fimea. Fimea advises against overstocking medicine. [cited 2020 May 1]. Available from: <https://www.fimea.fi/web/en/-/fimea-advises-against-overstocking-medicine>.
- [34] Finnish Government. Lääkkeiden riittävyttä ja lääkejaketun toimivuutta varmistetaan sosiaali- ja terveystieteiden päätöksellä; 2020. 57 https://valtioneuvosto.fi/artikkeli/-/asset_publisher/1271139/paatos.
- [35] Kela. Reseptilääkkeiden ostot ATC-luokittain. [cited 2020 Jun 5]. Available from: https://kelaresearchandanalytics.shinyapps.io/korona_atc_app/_w_216f41dd/.
- [36] Customs. Monthly statistics on the international trade in goods, March 2020. [cited 2020 May 16]. Available from: https://tulli.fi/tilastot/tilastojulkaisu/-/asset_publisher/tavaroiden-ulkomaankaupan-kuukausitilasto-maaliskuussa-2020.
- [37] Statistics Finland. Corona situation review of 29 May 2020: effects of the exceptional situation are reflected in the statistics and rapid preliminary data. [cited 2020 Jun 1]. Available from: https://www.stat.fi/index_en.html.
- [38] Ministry of Economic Affairs and Employment of Finland. Koronaviruksen vaikutukset työllisyystilanteeseen. [cited 2020 May 1]. Available from: <https://tem.fi/en/frontpage>.
- [39] EK. Luottamusindikaattorit. [cited 2020 May 27]. Available from: <https://ek.fi/wpcontent/uploads/Luottamusindikaattori202005.pdf>.
- [40] Helsinki Graduate School of Economics. Economics for the common good. 1 0.6.2020. <https://www.helsinki.fi/>.
- [41] Council of State. Economic Survey, Spring 2020. Publications of the Ministry of Finance 2020:32.
- [42] Finland's Bank. The worst-case scenario in the corona spring did not materialise, but we will still need stamina for the long haul. Bank Finland Bulletin 3/2020. [cited 2020 Jun 2]. Available from: <https://www.suomenpankki.fi/en/>.
- [43] Finanssiala. Suomea koskevat uusimmat ennusteet. [cited 2020 Jun 2]. Available from: <https://www.finanssiala.fi/tilastot/FA-tilasto-taloussennusteet.pdf>.
- [44] Mäkinen S. Koronaan liittyvillä rajoitustoimilla säästetyt laatu-painotetut elinvuodet (Quality-adjusted life years saved by COVID-19 related restriction measures, in Finnish), Finnish Institute for Health and Welfare. [2020 Jun 10]. Available from: <https://thl.fi/fi/web/sote-uudistus/talous-ja-politiikka/optimi-terveys-ja-sosiaalitalouden-uutiskirje/2020/koronaan-liittyvilla-rajoitustoimilla-saastetyt-laatu-painotetut-elinvuodet>.
- [45] Valtioneuvosto. Koronakriisin vaikutukset ja suunnitelma epidemian hallinnan hybridistrategiaksi. Valtioneuvoston julkaisuja 2020:12 [cited 2020 Jun 3]. Available from: http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162214/VN_2020_12.pdf?sequence=1&isAllowed=y%20.
- [46] Five coronavirus lessons: Finland's plans for a possible second wave. Yle Uutiset. [cited 2020 Jun 30]. Available from: https://yle.fi/uutiset/osasto/news/five_coronavirus_lessons_finlands_plans_for_a_possible_second_wave/11417687.